

Newark, Division of Water

ANNUAL REPORT
OF THE
ANNUAL REPORT DISTRIBUTION
OF THE (DIVISION OF WATER)
BUREAU OF DISTRIBUTION
(DIVISION OF WATER)

Mr. James W. Costello, Chief Engineer,
Division of Water, Department of Public Affairs,
Newark, New Jersey.

1 9 3 1

Dear Sir:
Mr. James W. Costello, Chief Engineer
Department of Public Affairs, Bureau of Distrib-
Newark, New Jersey.

Dear Sir: The Bureau of Inspection and of the water Laboratory
are embodied in this report.

The annual report of the various
Bureaus of the Division of Water is herewith
submitted.

During the year of 1931, the average daily
supply of water from the Passanock and the Manasquan Supply
was 52.5 million gallons, of which 6.7 million gallons
was delivered to other municipalities.

Respectfully,

Division Engineer.

To permit the reconstruction of the Passanock
supply, a portion of the 36" steel conduit from Cedar Grove
Reservoir was lowered in the vicinity of Meckel Street
and Bloomfield Avenue. The relaying of sections of the
36" steel conduit with 42" steel pipe from Belleville
Reservoir to the South Orange Avenue Reservoir was
started late in the year. Due to exterior corrosion
2750 linear feet of this line will be relaid and relocated
in Branch Brook Park from a point 275' south of Heller Parkway

to Newark Avenue and Third Street, and 2250 linear feet will be relaid under the Second River from the Newark and Belleville line.

ANNUAL REPORT
OF THE
BUREAU OF DISTRIBUTION

(DIVISION OF WATER)

1 9 3 1

Mr. Hermann Rosentreter, Division Engineer,
Division of Water, Department of Public Affairs,
Newark, New Jersey.

Dear Sir:

The annual report of the Bureau of Distribution for the year 1931, is herewith submitted; reports of the Bureau of Inspection and of the meter Laboratory are embodied in this report.

WATER SUPPLY

During the year of 1931, the average daily draft of water from the Pequannock and the Manaque Supply was 52.5 million gallons, of which 6.7 million gallons were delivered to other municipalities.

To permit the construction of the Meadowbrook sewer, a portion of the 36" steel conduit from Cedar Grove Reservoir was lowered in the vicinity of Heckel Street and Bloomfield Avenue. The relaying of sections of the 36" steel conduit with 42" steel pipe from Belleville Reservoir to the South Orange Avenue Reservoir was started late in the year. Due to exterior corrosion 2250 linear feet of this line will be relaid and relocated in Branch Brook Park from a point 275' south of Heller Parkway

to Davenport Avenue and Fifth Street, and 440 linear feet will be relaid under the Second River, at the Newark and Belleville line.

Work was completed on the grounds in the vicinity of Belleville Reservoir, which work consisted of grading, landscaping and show planting.

An interesting and important problem was met and successfully solved by the Division of Water this year which involved the cleaning of mud deposits in Macopin Intake Reservoir. These deposits ranged in depth from a thin coating to five feet and have been causing turbidity of the water and sedimentation in the pipes. After careful studies of the various methods of removal it was decided to purchase the necessary equipment and do the work with our own forces. The equipment consisted of a 6-inch hydraulic dredge completely equipped, together with a hydraulicking pump and the necessary piping which was used to loosen and wash the material which could not be reached by the dredge to a point where the dredge could pick the same up. Disposal areas for the removed material, consisting of mud, sand and leaf mold, were provided downstream of Macopin Dam. The total equipment cost approximately \$38,000 and the material to be removed amounts to approximately thirty thousand cubic yards. The work was started in the fall of this year and at the close of 1931 was approximately fifty percent completed. The cleaning operations will be continued whenever feasible during the year of 1932.

deducting old pipe which were taken out and adding new pipes of

large size in place of the old pipe removed, consists of

2,803,040 linear feet of 540 400 miles

The total length of pipe owned by the city is now approximately 530.68 miles on the low pressure system and about 27.66 miles on the high pressure system. Connected with the mains on the low pressure system are 4,241 fire hydrants and 381 on the high pressure system; 7,878 gates control the flow of water in mains on the low pressure system and 232 gates on the high pressure system. There are about 71,794 connections, known as services, of which 58,945 are in use, through which water for domestic, commercial and public use is drawn. There are 299 connections on the high pressure system, of which 266 are in use. The average pressure on the low pressure system varies from 25 to 75 pounds, and on the high pressure system from 100 to 160 pounds per square inch.

1931 was as STREET MAIN EXTENSION, LOW PRESSURE SYSTEM.

The total extension to street mains in the city during the year 1931 was as follows:

16,637 lineal feet = $3 \frac{797}{5,280}$ miles of from 4" to 36" diameter.

The amount of work done in relaying was as follows:

11,987 lineal feet = $2 \frac{1427}{5280}$ miles of from 6" to 60" diameter.

The amount of work done in lowering pipe was as follows:

197 lineal feet = $0 \frac{197}{5280}$ miles of 6" to 12" diameter.

The approximate mileage of pipe of different diameters, deducting old pipe which were taken out and adding new pipes of large size in place of the old pipe removed, consists of

2,803,040 lineal feet or $530 \frac{4640}{5280}$ miles.

Actual use was 266. The difference shows the services to

DISSEMINATION SYSTEM

The number of low pressure taps made during the year was 250. Of these 114 of 1-inch diameter, 26 of 1½-inch 54 of 2-inch 9 of 3-inch, 28 of 4-inch and 19 of 6-inch.

The total number of low pressure taps in the city at the first of January, 1932 was 71,794, while the number of taps in actual use as 58,945. The difference shows the services to vacant lots installed in advance of new pavements.

During the year 91 hydrants were set. Of these 51 were substituted in place of old hydrants and 40 were added to the number already in place, 11 taken out and not replaced, making the total number of hydrants:

In the City	4,193
Silver Lake Section and Belleville Reservoir	48
	4,241

STREET MAIN EXTENSION, HIGH PRESSURE SYSTEM.

The extension of high pressure mains during the year 1931 was as follows:

4,164 lineal feet = 0 $\frac{4164}{5280}$ miles of from 12" to 30" diameter

The approximate mileage of high pressure pipe of different diameters up to December 31, 1931, was as follows:

146,049 lineal feet = 27 $\frac{3489}{5280}$ miles.

During the year 7 high pressure hydrants were set. Of these one was substituted in place of old hydrant and 6 were added to the number already in place, 3 taken out and not replaced, making a total of 381 high pressure hydrants in the city. The number of high pressure taps made during the year was 7.

The total number of high pressure taps in the city at the 1st. of January, 1932, was 299, while the number of taps in actual use was 266. The difference shows the services to

vacant lots installed in advance of new improvement.

CONSUMPTION.

The total amount of water diverted from the Pequannock Watershed during the year was 19,163.2 million gallons, also 2,940.2 million gallons was received from the Wanaque Watershed, which is an average daily of 52.5 million gallons. This is 5.2 million gallons less than the consumption of 1930. The average daily consumption in the City of Newark was 45.8 million gallons.

During 1931, 14 breaks on mains and 302 leaks on services were repaired. 1,440 poor pressures were investigated, 2,603 leaks were investigated and 536 services cleaned out.

The use of hydrants by authorized and illegal users throws a heavy burden on the repair forces of the Division. In view of the fact that in 1931 1261 repairs of all kinds were made to hydrants (out of a total of 4,241) it might be advisable to install special standpipes for the use of the street flushers. James Scully of the Meter Laboratory reports that there were 57,189 meters of various makes in service on December 31, 1931, ranging in size from 1/2-inch to 16-inch. Of the meters removed to the laboratory, 238 were found damaged by frost, 2,833 meters found stuck, 195 found damaged by excessive heat, 306 meters for test at laboratory, 667 meters were tested or repaired and tested on the premises and special work totaling 6,200 calls were attended to in the field. Total number of meters December 31, 1931, 57,523.

Respectfully submitted,

Robert C. Nichols

Engineer in Charge

Mr. Arthur R. Stemmler of the Bureau of Inspection reports that the men of his Bureau performed the following work during the year:

Meter Inspections	2,200
Service Inspections	1,541
Special Investigations	8,415
Special Meter Readings	2,665
Searches	370
Surveys	1,121
By-Passes Locked	177

Twenty-five meters supplying other municipalities are read weekly by the Bureau of Inspection. In addition to the above special effort was made to locate cross connections between the city supply and private systems. Eight cross connections were found and removed.

Mr. James Woolley of the Meter Laboratory reports that there were 57,189 meters of various makes in service on December 31, 1931, ranging in size from 1/2-inch to 16-inch. Of the meters removed to the laboratory, 238 were found damaged by frost, 2,833 meters found stuck, 195 found damaged by excessive heat, 308 meters for test at laboratory, 667 meters were tested or repaired and tested on the premises and special work totaling 6,200 calls were attended to in the field. Total number of meters December 31, 1931, 57,529.

Respectfully submitted,

Robert O. Scholz

Engineer in Charge

DIVISION OF WATER

SUMMARY OF STATISTICS OF THE NEWARK

NEW JERSEY, WATER WORKS.

For Year Ending December 31, 1931.

Population by census 1930	440,000
Date of construction	1889-1891
By whom owned	City of Newark
Source of supply	Peguannock and the Wanaque Watershed
Mode of supply	Gravity

STATISTICS OF CONSUMPTION OF WATER.

Population, City of Newark	445,000
Consumption for the year, City of Newark	MG 16,709.7
Consumption for the year, Town of Belleville	MG 628.2
Consumption for the year, Portion of Bloomfield	MG 985.0
Consumption for the year, Town of Elizabeth	MG 457.1
Consumption for the year, Town of Nutley	MG 383.2

Total consumption for the year

MG	19,163.2
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Passed through meters in the city	M.G 14,348.87
Percentage of consumption metered in the city	85.87%
Average Daily consumption city and suburbs	MG 52.5
Average daily consumption in the city	M.G. 45.8
Gallons per day to each inhabitant in the city	102.92
Gallons per day to each tap in use in the city	756.61
Cost of supplying water per million gallons figured on total maintenance	\$90.48
Total cost of supplying water per million gallons figured on total maintenance, plus interest on bonds ...	\$152.61

STATISTICS REGARDING DISTRIBUTION SYSTEM

Mains, Low Water Pressure

Kind of pipe	Cast iron and steel
Size from	4-inch to 60-inch
Extended	16,637 feet during year
Discontinued	3,303 during year.
Total now in use	530-4640/5280 miles
Number of hydrants added during the year	40
Number of hydrants discontinued during the year	11
Number of public hydrants now in use	4,241
Number of stop gates added during the year	173
Number of stop gates now in use	7,878
Range of pressure on distributing mains.....	25 to 75 lbs.

MAINS, HIGH PRESSURE SYSTEM

Kind of pipe	Cast Iron
Sizes from	6-inch to 30-inch

Extended 4,164 feet during year
 Discontinued none
 Total now in use miles..... 27-3489/5280
 Number of hydrants added during the year 7
 Number of public hydrants now in use 381
 Number of stop gates added during the year 10
 Number of stop gates now in use 232
 Range of pressure on high pressure system 100 to 160 lbs.

SERVICES, LOW PRESSURE SYSTEM

Kind of pipe Lead and cast iron
 Sizes 5/8-inch to 6-inch
 Number of service taps added during the year
 (5/8-inch to 6-inch diameter) 250
 Number of services abandoned 299
 Number of services in city 71,794
 Number of service taps now in use
 (5/8-inch to 6-inch diameter) 58,945
 Number of meters added 335
 Revised list of meters now in use 57,412
 Percentage of services in use metered 97.39%

CONNECTIONS, HIGH PRESSURE SYSTEM

Kind of pipe Cast iron
 Sizes 1½-inch to 6-inch
 Number of connections added during the year 11
 Number of connections in city 299
 Number of connections in use (1½-inch to 6-inch) 266
 Number of meters added 5
 Revised list of meters now in use 117
 Percentage of connections in use metered 43.98%

August	1780.7	57.4	1506.3	48.6	74.7	3.29
September	1760.2	56.8	1497.4	49.9	71.5	2.09
October	1637.1	52.6	1358.3	43.8	59.7	3.23
November	1457.4	48.6	1239.1	41.3	51.2	1.00
December	1520.4	49.8	1291.3	41.7	40.4	1.95
Total	19165.2	629.7	16709.7	529.3	399.14	
Average		52.5		45.6		

1/12/32 Population of Newark Dec. 31, 1931 by Board of Health
 445,000. Estimated.

1/12/32 Town of Belleville - Estimated population Dec. 31, 1931
 27,000

of water, Newark, N. J.
H. ROSENTHRETER, Division Engineer.

CONSUMPTION STATEMENT YEAR ENDING DECEMBER 31, 1931.

1931 MONTH	Total Consumption per Month, Million Gal- lons, Newark, Eliz- abeth, Bloomfield, Belleville, Kearny, Nutley	Average Daily Con- sumption, Million Gallons, Newark and Suburbs.	Total Consumption per Month - Million Gallons, Newark	Average Daily Con- sumption, Million Gallons, Newark.	Average Temperature Newark	Rainfall, Inches, Newark.
January	1563.6	50.4	1408.3	45.4	32.5	2.37
February	1390.1	49.6	1237.9	44.2	34.2	2.99
March	1532.1	49.4	1393.9	45.0	38.8	4.73
April	1512.8	50.4	1363.2	45.4	51.3	3.11
May	1592.1	51.4	1405.9	45.4	62.7	4.76
June	1647.4	54.9	1470.5	49.0	71.6	4.91
July	1773.4	57.2	1537.6	49.6	77.7	4.71
August	1780.7	57.4	1506.3	48.6	74.7	3.29
September	1764.1	58.8	1497.4	49.9	71.5	2.09
October	1629.1	52.6	1358.3	43.8	59.7	3.23
November	1457.4	48.6	1239.1	41.3	51.2	1.00
December	1520.4	49.0	1291.3	41.7	40.4	1.95
Total	19163.2	629.7	16709.7	549.3		39.14
Average		52.5		45.8		

1/12/32 Population of Newark Dec. 31, 1931 by Board of Health
445,000, Estimated.

1/12/32 Town of Belleville - Estimated population Dec. 31, 1931
27,000

Charlotteburg, N. J.

Hermann Rosentreter, Esq.,
Division Engineer, Div. of Water,
Dept. of Public Affairs,
Newark, N. J.

Dear Sir:-

I herewith present the annual report of the
Bureau of Water Supply for the year ending December 31, 1931.

IMPROVEMENTS:-

The outstanding development of the Bureau for the
year, (exclusive of continued rigid sanitary work) was the con-
tinued wood cutting for the poor and the employment of citizens
of Newark on the watershed for that purpose.

This emergency labor was and is picked from the
lists of the worthy unemployed of the city by the City Commissioners
through the Poor and Alms Department. The men are given four dollars
per day, three days per week, and are transported by bus. Hot coffee
is furnished the men together with efficient medical attention.

The first emergency group of ninety-one started
November 16, and up to date, the emergency personnel has reached
four hundred and seventy. The men were put to work in groups
averaging thirty under proper instructors and have been used for
cutting and hauling wood, clearing territory adjoining highways,
building necessary roads for fire control, and hauling wood. The
wood is transported by teams to loading platforms in Passaic and
Morris Counties and shipped to Newark via the New York Susquehanna

and Western and the Wharton and Northern Railroads, and distributed free to the worthy poor.

The wood shipped represented the necessary improvement cutting in the watershed. This leaves the remaining timber in proper condition and number; and insures the future value of the remaining trees and provides for a proper second growth.

During the year five thousand nine hundred cords of wood have been shipped. With wood roads finished and preliminary work finished, production is increasing daily. It is planned to use some of the emergency labor early next year in general improvement work, particularly in an enlarged tree planting program.

This general forestry program is a valuable and necessary background for the employment of many men for a considerable period of time.

SANITATION:

The most modern equipment for the necessary treatment of the water has been installed at Macopin Intake and plans approved for the cleaning have been improved.

Additional concrete toilets and cesspools have been installed where necessary and forty movable toilets are placed for the emergency gangs through the woods on the jobs and cleaned daily. A sanitary inspector is assigned for this work, supplementing the work of the sanitary guards. All garbage and refuse is collected in the entire watershed and disposed of at the watershed incinerating plant in Newfoundland. All toilets and cesspool product is disposed of at the watershed disposal plant at New Village.

The papers etc. that are strewn along the highway are collected. The patrol force inspects all streams daily and make house inspections. Inspection is made of all trains and the lavatories kept locked while passing through the watershed. Many tests and inspections are made by our division chemists, the health boards of Newark, the State and the National Health.

FIRE PROTECTION:-

The watershed fire protection system again won the commendation of the authorities of the State Department of Conservation and Development. This organization, consisting of watershed employees, has been equipped with most modern agencies for forest fire fighting and has been a valuable aid to all adjacent territory. All tree plantations are ringed with fire lines, brush, etc. kept down, fire roads established and in spring and fall extra patrols are established.

The improvement cutting of the Emergency pen in the hard wood sections is of material aid. The watershed loss from fire is very low per acre, compared to other sections. The State Fire Wardens co-operate well.

AESTHETIC VALUES:1

The removal of all advertising signs and bill boards from all City owned property continues to be favorably commented on. Beautiful rustic signs furnished by the City now mark all the roads at the limits of the watershed. This with keeping the roads clean and carrying out a scheme of roadside beautification make a pleasing whole that calls to the visitors' attention that they are in the Watershed.

The rest areas in the watershed were well patronized and special guards supervise them on week ends and holidays. Rigid inspection has suppressed somewhat the vandalism. The stealing of young trees and the destruction and mutilation of shrubbery has decreased somewhat.

FORESTRY:-

The improvement cutting in the hardwoods and shipping of the wood to the poor of Newark, has been dealt with in another section of this report.

Some 150,000 trees were taken from the nurseries and placed on prepared ground in the Oak Ridge section. 75,000 red pine 25,000 Norway Spruce and 25,000 Scotch Pine seedlings were placed in the nurseries. In the preparation of the land for trees sufficient oats and hay has produced to feed the nine City horses here, and a sum of money secured for the excess sufficient to pay for the new seedlings. John Heilman, recently appointed Division Forester has been of material aid in the preparation of plans for forestration for 1932.

GENERAL DATA:-

The following buildings were destroyed during the year.

Barn-property #70 Echo Lake

House * #183-Echo Lake

House * #422-B-Stockholm.

Store and Property #407-A-Stockholm.

Barn Property #91-Echo Lake

House * #293-Holland Mountain

REST AREAS:-

The rest areas in the watershed were well patronized and special guards supervise them on week ends and holidays. Rigid inspection has suppressed somewhat the vandalism. The stealing of young trees and the destruction and mutilation of shrubbery has decreased somewhat.

FORESTRY:-

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GENERAL DATA:-

The following buildings were destroyed during the year.

Barn-property #70 Echo Lake

House " #183-Echo Lake

House " #422-B-Stockholm.

Store and Property #407-A-Stockholm.

Barn Property #91-Echo Lake

House " #293-Holland Mountain

PROPERTIES PAINTED AND REPAIRED:-

House-Property #2-H-Macopin Village

" " "2-J- " "

" " "2-F- " "

School " "2-A " "

House #6 Offices, garages Charlottetown

House #443 - Canistota

House #205 - Newfoundland

House #28 - Newfoundland

" #146 - "

" #43-0- "

Minor repairs to a number of city properties. Small
repairs and painting gate houses at the reservoirs.

TREATMENTS:-

Treating Oak Ridge and Echo Lake reservoirs with Copper
Sulphate. Treating Streams of these reservoirs with copper sulphate.
General improvements such as cutting grass on dams etc.,
at all the reservoirs.

STREAM CLEANING:-

Considerable stream cleaning and brush cutting on the
rivers in Stockholm, Veron, Oak Ridge, Clinton, Newfoundland and
Charlottetown sections.

Respectfully submitted.

Thomas W. Reilly

Supt. Bureau of Water Supply

Mr. Hermann Rosentreter, Division Engineer.

Division of Water, Department of Public Affairs,
Newark, N. J.

Dear Sir:-

Submitted herewith is the annual report covering activities of the Cedar Grove Laboratory, Division of Water for the year ending December 31st., 1931.

The microscopical, bacteriological and chemical examinations of water were continued as in former years. The following number of samples from the various sources were examined:

<u>Source</u>	<u>Microscipical</u>	<u>Bacteriological</u>
Aqueduct #1 & #2 Great Notch	598	607
Cedar Grove Reser. Effluent	298	301
Belleville Reservoir Effluent	1	295
Wanaque Supply at Belleville	286	299
So. Orange Ave. Reser. Effluent	1	254
Newark City Taps		105
Macopin Intake	53	54
Echo Lake Brook	55	40
Kanouse Brook	52	52
Clinton Brook	56	52
Oak Ridge Brook	88	52
Cedar Grove Reservoir Proper	33	7
Belleville Reservoir Influent		9
Wanaque Supply at Pequannock	7	5
New Pipes in City		82
Special	2	10
Mr. Weston's Samples		168
Total	1530	2392

Microscopy

The detection of microorganisms in water is utilized for the express purpose of controlling those that may affect its aesthetic quality, such as odor, taste and color.

Synura appeared in Cedar Grove Reservoir on January 28th, but due to the presence of ice in the reservoir it was impossible to treat with copper sulphate. These synura continued in small amounts without seriously affecting the supply, until April when they disappeared of their own accord.

On April 17th, Echo Lake was ordered closed down and treated due to the presence of 5500 Diatoms and some synura. These microorganisms produced a musty-fishy to grassy odor and taste. Chlorination had a tendency to make it still more pronounced. Due to rain and heavy runoff treatment was delayed until May 4th. By June 5th, the reservoir was again ready for use.

Dinobryon, Synura and Uroglena made their appearance in Oak Ridge Brook on March 3rd. However, the microorganisms were not in sufficient quantity to warrant treatment until April 30th. We began treatment of the brook on May 1st., but due to heavy runoff the treatment was not effective. The doses of copper sulphate were increased daily until May the 6th, with no apparent success. Field tests were made on May 7th, bringing the troublesome microorganisms under control. It became necessary to continue treatment until May 28th, when it was discontinued due to reduction of microorganisms.

On May 18th, the chlorine plant at Cedar Grove was started in order to control the Crustacea Cyclops present in the reservoir. By June 1st. Cyclops had disappeared and chlorination discontinued.

Dinobryon together with Anabaena increased gradually from October 27th, until November 20th, when the Oak Ridge Reservoir was ordered shut off and treated. Treatment was begun on November 23rd. of the reservoir proper. Oak Ridge was again ready for use on November 30th.

Bacteriology.

The systematic Bacteriologic examination of the water from the various sources were made as formerly. The procedures of the American Public Health Association and The United States Public Health Service, supplemented by methods we find better adapted to our own water supply were followed in the laboratory. The later methods serve for the purpose of checking the former.

In May due to after-growths in Belleville and South Orange Avenue Reservoirs sanitary inspections were made. Recommendations for improvements at the time were made and carried out. Belleville Reservoir immediately improved in Bacterial Flora, while South Orange Ave. Reservoir due to dust and bird contamination did not fare so well.

Complaints were received around June 1st. that too much chlorine was being placed in the water. It was stated a year previous, that we would reach a saturation point for chlorine in Pequannock water. After that, the aesthetic quality of the water would be affected. This condition occurred in the summer of 1931. A new method of chlorination became apparent. Mr. Robert Spurr Weston, Consulting Engineer was engaged, and after much experimenting in our laboratory, the chloramine process of treating water was adapted for summer use. This process and results will be described under Purification.

In the past it was customary to report the partially confirmed gas tubes as final. This past summer we began testing all treated waters to completion. In this way we can note just which particular bacteria is present and possible trace its source.

Bacteriological tests were made of dead end pipes to note the effect of chloramine on them.

On October 8th, a case of Typhoid Fever was reported by the State Board of Health in our watershed. On investigation it was found to be out of the Pequannock Watershed. However, tests were made about the premises and evidence of Pathogenic Bacteria lacking.

A complete chemical analysis was made of the delivered Pequannock water monthly. Samples were taken at the Cedar Grove Reservoir Effluent.

In July and August field tests were made on Chlorine residuals in Newark, Bloomfield, Belleville and Nutley.

A complaint of lead poisoning was reported in Newark. On analysis it was found that the drinking water was not responsible. A number of free ammonia tests were made throughout Newark to see how far the ammonia from the chloramine would carry.

In addition to the regular chemical tests, a large number of physical tests were made for the chloramine experiments.

Samples submitted and examined Bureau of Water 5; Bureau of Sewers 2.

Purification-Chlorination.

The new chlorine machines functioned efficiently throughout the year in assisting us to deliver water free from pathogenic bacteria.

Ortho-tolidine tests were made hourly on both pipe lines at Intake to determine free chlorine residual. These residuals are further checked on both pipe lines at Great Notch.

On July 25th, after a month of experimenting in the laboratory, we started the Chloramine treatment of water, which consists of the use of chlorine in conjunction with ammonia. This was carried on, on Aqueduct #1, while Aqueduct #2 was treated with chlorine alone as heretofore. An ideal condition existed for comparison of both methods.

Previous to the use of chloramine it was difficult to obtain a chlorine residual at Great Notch, without seriously impairing the taste and odor. Bacteria occluded in amorphous matter would give after growths. Now with the chloramine it is possible to carry a higher excess with less chlorine than heretofore. We therefore have a longer sterilization period to assist in eliminating these aftergrowths. Improved results were shown in the entire treated Pequannock System. Cedar Grove Reservoir which had to be chlorinated in previous summers, did not require treatment this past summer. Microorganisms usually present in the fall in Cedar Grove Reservoir, did not appear last fall. For summer operation chloramine is ideal for our water supply, however there are difficulties to be overcome as yet for winter use. The process still being in the experimental stage is new in water supply treatment. It assists us in producing a cleaner tasting water.

On October 7th, Aqueduct #2 was closed down to make ready for the cleaning and dredging of Macopin Intake. Years of silt and runoff amorphous matter have settled here and has made it necessary to clean same to improve the quality of the water and lower the chlorine demand.

May I here mention the importance of chloramine operation being under strict laboratory control. It is delicate and the recommendations mentioned in Mr. Weston's report should be adhered to.

Wanaque Supply:

Daily bacterial, Microscipical and chlorine residuals are made.

Wanaque has produced a water of excellent bacterial quality this past year. At times the aesthetic quality was objectionable due to the presence of a large number of Diatomes.

Conclusion and Recommendations.

1. Anti-Chlor apparatus installation head of Wayne Supply.
2. Continue sending all Newark Water by way of Cedar Grove Reservoir.
3. Weekly chlorination So. Orange Ave. Reservoir in Summer.
4. Completion of establishing of permanent watershed sampling stations already started.
5. Completion of compiling watershed data of laboratory for past five years, to note reason for any existing condition in supply.

Respectfully submitted,

J.F.D. Bauermann
Ass't. Bact. and Chemist-in-Charge.